

Fish Stock Survey of Transitional Waters in the South Western River Basin District 2020

Bandon Estuary

IFI/2020/1-4529



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Fish Stock Survey of Transitional Waters in the South Western River Basin District 2020– Bandon estuary

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Contents

1. Summary	5
2. Introduction	5
3. Methods.....	6
4. Results.....	7
4.1 Data summary – 2020 survey	7
4.2 Comparative analyses	9
4.2.1 Abundant species.....	9
4.2.2 Key species.....	10
4.2.3 EMFI quality rating.....	11
5. Discussion.....	12
6. References	13

1. Summary

This report presents fish capture data collected during Inland Fisheries Ireland (IFI) surveys of transitional waterbodies. This report focuses on the survey which was conducted within the Bandon estuary on the south coast of Ireland. The Bandon estuary is divided into two water bodies, the Upper Bandon and the Lower Bandon and are classified separately. It was conducted primarily to designate an ecological status based on fish populations, as per the requirements of the Water Framework Directive (Directive 2000/60/EC). The populations of species of angling and conservation importance are also discussed.

A number of fish sampling methods were used to ensure that a range of habitat types were sampled, thus making it likely that all fish species present in the estuary were captured. Across the survey, a total of 23 species and 545 individual fish were captured in the Lower Bandon. A total of 4 species and 649 individual fish were captured in the Upper Bandon. Current data was also compared to previous surveys in 2009 and 2016 (Lower Bandon only) to assess how fish populations have changed in the intervening years.

2. Introduction

The Bandon estuary is situated on Ireland's south coast, with the mouth of the estuary located directly south-east of Kinsale town, Co. Cork (Fig. 1). The estuary extends as far inland as the town of Inishannon (approximately 19km) and the harbour area around Kinsale is a traditional commercial port with a significant amount of boating traffic from fishing boats and recreational watercraft. The Bandon estuary covers an area of 7.1km², the Lower Bandon estuary comprises the bulk of area covering 6.8km², while the Upper Bandon covers 0.35km².

The main objectives of the current survey are:

- To measure the ecological status of fish populations in the estuary complex as per the requirements of the European Water Framework Directive (WFD; 2000/60/EC).
- To examine fish population dynamics in the estuary.
- To provide scientific advice to support conservation measures within the estuary complex.

According to the WFD, ecological status of waterbodies must be assessed by both a number of physical and chemical characteristics and a range of biological indicators. Fish populations are one of the key biological indicators of ecological status in transitional waters. Essentially, they are assessed by comparing data collected from monitoring against reference (natural)

conditions. Fish status was assessed using the estuarine multi-metric fish index (EMFI) (Harrison and Kelly, 2013) to derive ecological status. As the estuary was surveyed in 2009 and 2016, it was possible to examine any changes in population structure in the intervening years.

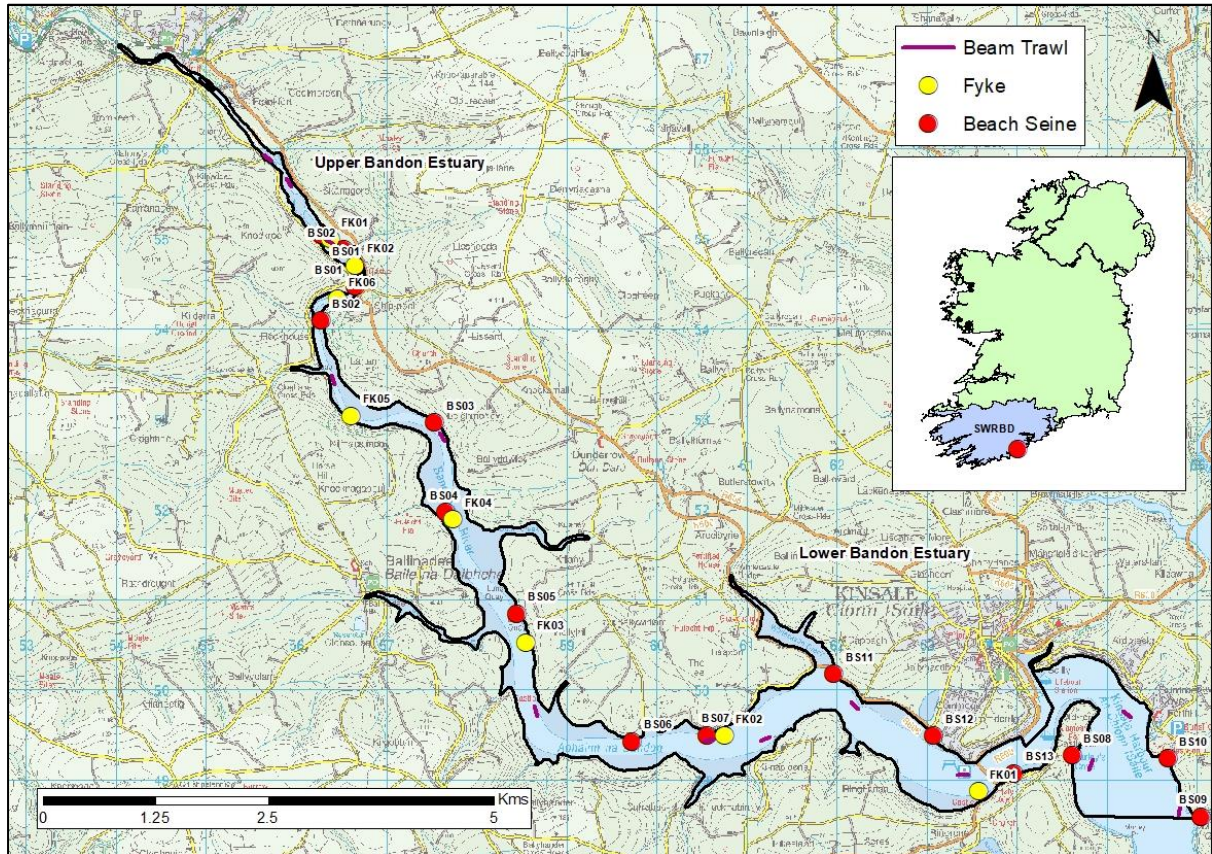


Fig. 1: Map of the Bandon Estuary showing all samples taken during the September-October 2020 survey.

3. Methods

The Bandon estuary covers an area of 7.1km². Fish stock surveys were conducted to ensure sufficient coverage of the water body so that stocks could be assessed. Sampling took place between 30th September and 2nd October 2020. Habitat type across the sites ranges from soft mud to cobble shores and sandy beaches and brackish to fully saline and all in between. The separate waterbodies are described in more detail in www.wfdfish.ie.

Current work in the Republic of Ireland and United Kingdom indicates the need for a multi-method (beach seine, fyke net and beam trawl) approach to sampling fish in estuaries and these procedures are now the standard IFI methodology for fish stock surveys in transitional waters for the WFD monitoring program.

In 2020, due to Covid-19 (i.e. social distancing) and manual handling considerations a lighter beach seine and reduced numbers of fykes in each fyke set were utilised. Beach seining was conducted using a 30m x 2.5m net (14mm mesh size side panels 12m x 2.5m with the middle/bunt of the net 6.5mm mesh size 6m x 2.5m) to capture fish in littoral areas. The bottom of the net has a weighted lead line to increase sediment disturbance and catch efficiency. Fyke nets (15m in length with a 0.8m diameter front hoop, joined by an 8m leader with a 10mm square mesh) are used to sample benthic fish in the littoral areas. Previous surveys used 3 fyke nets tied together to form a set whereas 2 fykes were tied together to form a set in 2020. Beam trawls are used for sampling benthic fish in the littoral and open waters, where bed type is suitable. The beam trawl measures 1.5m x 0.5m, with a 10mm mesh bag, decreasing to 5mm mesh in the cod end. The trawl is attached to a 20m tow rope and towed by a boat. Trawls are conducted along transects of 100m in length.

All nets are processed on-site by identifying the species present and counting the total numbers caught in each. Length measurements are recorded for each species using a representative sub-sample of 30 fish if necessary. Unidentified fish specimens were retained for subsequent identification in the laboratory.

A handheld GPS was used to mark the precise location of each site. Physiochemical data were also collected at each beach seine site.

4. Results

4.1 Data summary – 2020 survey

A total of 29 samples were taken using three different sampling methods (13 beach seine, 6 fykes and 10 beam trawls), over the course of the sampling programme in the Lower Bandon estuary (Fig 1). In the Upper Bandon estuary, a total of 7 samples (Fig 1) were taken using the same methods (2 beach seine, 2 fykes and 3 beam trawls). Temperatures ranged from 11.9-14.8 °C (mean = 13.8°C) and salinity (PPT) ranged from 0.1 to 33.8 (mean= 18.8) in the Lower Bandon estuary. In the Upper Bandon estuary, temperatures ranged from 12.1-13.0 °C (mean = 12.7°C) and salinity (PPT) ranged from 0.1 to 0.2 (mean= 0.1).

In the Lower Bandon estuary 545 individual fish were captured, counted and identified to species level prior to release. Twenty three different fish species were encountered over the course of the survey (Table 1).

Table 1: List of species captured during the 2020 WFD survey of the Lower Bandon estuary

Species	Total count	Count measured	Ave length(cm)	Max length(cm)	Min length(cm)	Standard deviation (cm)	Relative abundance %
Black goby	6	6	9.8	11.7	7.2	1.7	1.1
Corkwing wrasse	8	8	5.7	7.2	3.7	1.4	1.5
European eel	7	7	52.9	68.0	41.0	9.2	1.3
Fifteen-spined stickleback	10	10	10.4	12.9	8.6	1.3	1.8
Five-beard rockling	24	24	14.6	25.2	11.3	3.3	4.4
Flounder	70	52	10.2	20.0	5.6	3.5	12.8
Grey gurnard	3	3	9.6	13.6	4.2	4.9	0.6
Lesser sandeel	1	1	8.2	8.2	8.2	N/A	0.2
Lesser weever	2	2	10.4	10.6	10.2	0.3	0.4
Long-spined sea scorpion	2	2	9.8	10.3	9.2	0.8	0.4
Mackerel	3	3	21.1	21.5	20.8	0.4	0.6
Nilsson's pipefish	1	1	12.6	12.6	12.6	N/A	0.2
Plaice	3	3	6.7	8.2	5.4	1.4	0.6
Pogge	1	1	7.1	7.1	7.1	N/A	0.2
Pollack	17	17	13.4	17.5	10.7	1.8	3.1
Rock goby	3	3	6.4	7.2	5.2	1.1	0.6
Sand goby	346	215	5.2	8.2	3.0	1.5	63.5
Sea trout	1	1	25.0	25.0	25.0	N/A	0.2
Sprat	12	12	7.5	13.8	5.8	2.8	2.2
Thick-lipped grey mullet	4	4	3.3	3.4	3.2	0.1	0.7
Tub gurnard	1	1	7.4	7.4	7.4	N/A	0.2
Two-spotted goby	9	9	4.2	5.0	3.7	0.4	1.7
Whiting	11	11	12.7	16.6	9.6	2.4	2.0

In the Upper Bandon estuary 649 individual fish were captured, counted and identified to species level prior to release. Four different fish species were encountered over the course of the survey (Table 2).

Table 2: List of species captured during the 2020 WFD survey of the Upper Bandon estuary.

Species	Total count	Count measured	Ave length(cm)	Max length(cm)	Min length(cm)	Standard deviation (cm)	Relative abundance %
European eel	2	2	43.5	45	42	2.1	0.3
Flounder	82	79	7.9	20.5	4.1	3.5	12.6
Sand goby	564	75	4.8	8.2	3.1	1.3	86.9
Whiting	1	1	17.5	17.5	17.5	N/A	0.2

4.2 Comparative analyses

4.2.1 Abundant species

Lower Bandon

Sand goby were by far the most abundant species within the estuary in 2020, making up over 63% of the total catch (Fig. 2). Flounder and five-bearded rockling were also common, making up 12.8 and 4.4 % of the total catch, respectively. The relative abundance of sand goby remained unchanged between the 2016 and 2020 survey. Relative abundance of flounder fluctuated between surveys while five-bearded rockling abundance has increased over time.

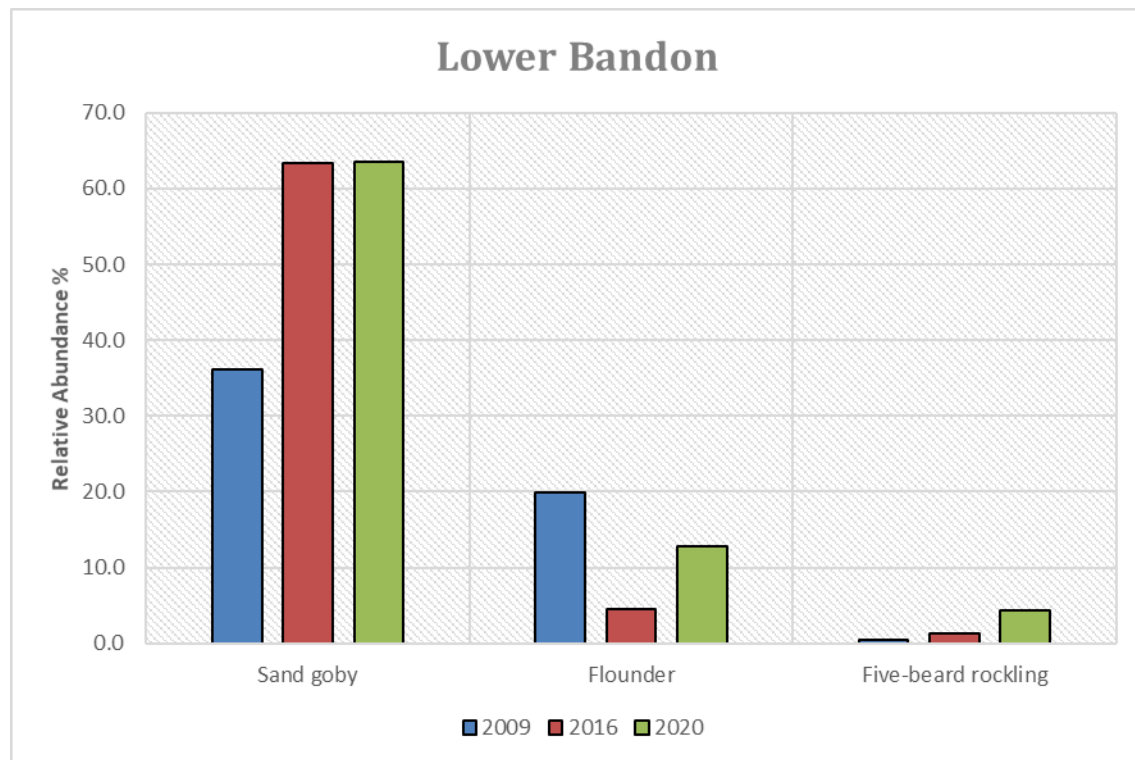


Fig 2: Relative abundance of the most abundant species captured during the 2020 WFD survey of the Lower Bandon estuary and comparison with the 2009 and 2016 surveys.

Upper Bandon

Sand goby were by far the most abundant species within the estuary in 2020, making up over 86% of the total catch (Fig. 3). Flounder and eel were the next most abundant species, making up 12.6 and 0.3 % of the total catch, respectively. The relative abundance of sand goby was considerably higher in 2020 compared to 2009 while flounder was the dominant species in 2009. Eel made up a small component of the catch in both surveys.

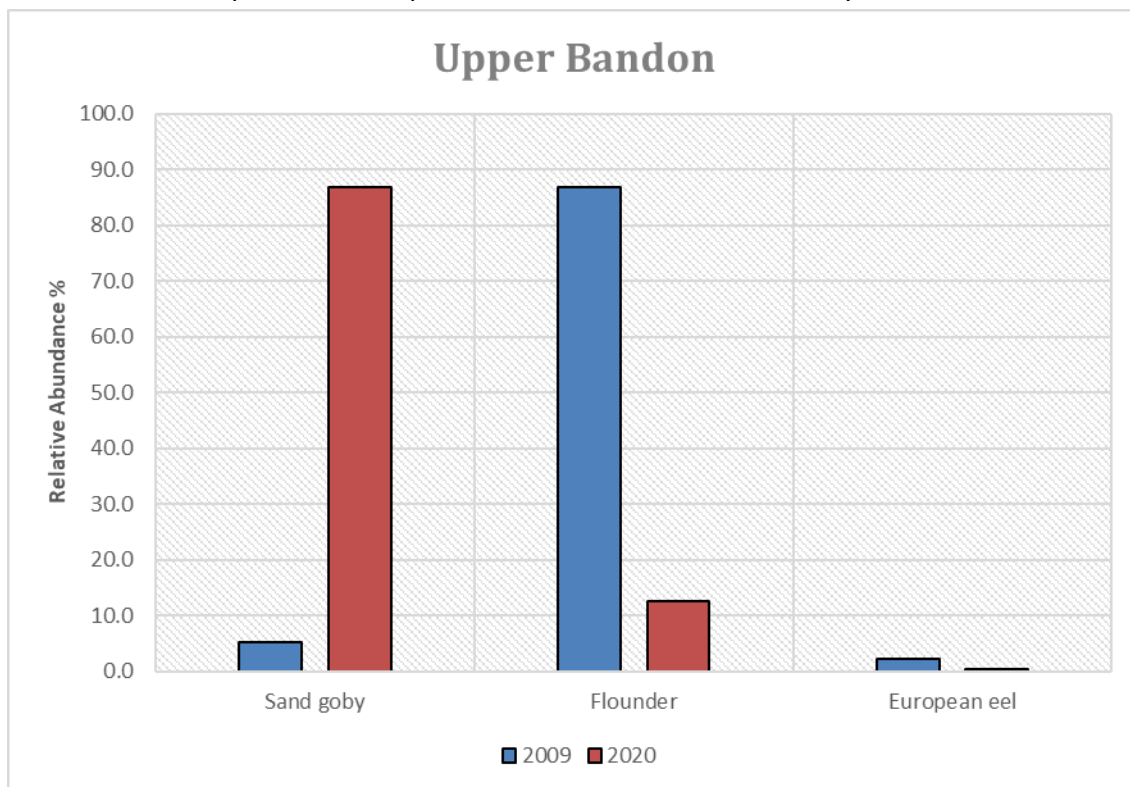


Fig 3: Relative abundance of the most abundant species captured during the 2020 WFD survey of the Upper Bandon estuary and comparison with the 2009 survey.

4.2.2 Key species

The Bandon estuary is noted fishing venue for bass, flounder, cod, dogfish and variety of other species (<https://fishinginireland.info>). No bass, cod or dogfish, popular angling species in the south of Ireland generally, were captured during the survey. Flounder, another popular angling species, were captured at most sampling and were common throughout the estuary. One sea trout was captured off a sandy beach in the Lower estuary. Several black goby and long spined sea scorpions were captured (Plate 1). These fish are occasionally targeted by anglers involved in species hunt competitions.

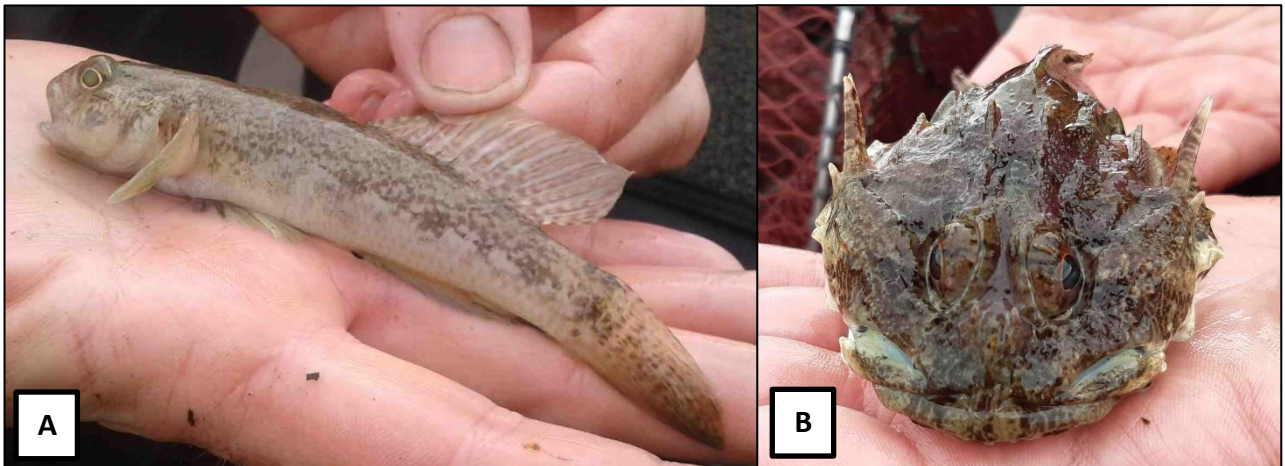


Plate 1. A) Black goby

B) Long spined sea scorpion

4.2.3 EMFI quality rating

The Lower Bandon estuary achieved good status in 2020 which was the same status it achieved in 2009 and 2016 (Table 3). The Upper Bandon estuary was classified as poor which is the same status it achieved in 2009.

Table 3. EMFI quality ratings of the Upper and Lower Bandon estuary 2009-2020

Name	Year	EMFI	EQR	Classification
Lower Bandon Estuary	2009	63	0.88	Good
Lower Bandon Estuary	2016	51	0.66	Good
Lower Bandon Estuary	2020	59	0.80	Good
Upper Bandon Estuary	2009	30	0.29	Poor
Upper Bandon Estuary	2020	32	0.32	Poor

5. Discussion

Sand goby and flounder made up over 99% and 76% of the catch in the Upper and Lower Bandon (Table 1-2). Sand goby was the dominant species in both waterbodies and are an important prey species (Keinänen *et al.* 2017, Souza *et al.* 2015).

The lack of habitat diversity, small size of the upper estuary, and poor water quality may contribute to the poor status of the Upper Bandon estuary. Habitat complexity and variability plays a significant role in promoting abundance, diversity, and persistence of species in a wide array of ecosystems (Moyle *et al.* 2010). Thus, the uniform habitat observed in the Upper Bandon estuary could be limiting the species diversity which in turn is one of the factors driving the EQR score which is leading to the estuary's poor status. In contrast, the Lower Bandon estuary has wide range of habitats supporting numerous species which were captured and achieved a good status.

Access to survey sites in the Upper Bandon estuary was limited due to very shallow water at the time of the survey. All of the samples were taken in the lower portion of the upper estuary. If the upper reaches could be sampled a more freshwater species (e.g. three-spined stickleback, brown trout and salmon) may be captured potentially resulting in a better status. The EQR score for the Upper Bandon improved slight compared to the 2009 survey (Table 3).

As the estuaries are intrinsically linked the individual waterbodies of the Upper and Lower Bandon estuaries were combined into the Bandon Complex and run through the status calculation model. Combined the Bandon Complex achieved good status in 2020.

6. References

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